

### CLAIMS

1. A group I-VII semiconductor single crystal thin film formed on a substrate made from ionic single crystals,

the group I-VII semiconductor single crystal thin film being formed on a buffer layer while an electron beam is irradiated on the group I-VII semiconductor single crystal thin film, the buffer layer being for alleviating distortion caused due to a difference in lattice constant between the substrate and the group I-VII semiconductor single crystal thin film.

2. A group I-VII semiconductor single crystal thin film comprising:

a layer formed while irradiating an electron beam thereon; and

a layer formed while not irradiating the electron beam thereon.

3. The group I-VII semiconductor single crystal thin film as set forth in Claim 1, comprising:

a layer formed while irradiating an electron beam thereon; and

a layer formed while not irradiating the electron beam thereon.

4. The group I-VII semiconductor single crystal thin film as set forth in any one of Claims 1 to 3, having a film thickness that allows an internal electric field to be resonance-increased.

5. The group I-VII semiconductor single crystal thin film as set forth in any one of Claims 1 to 4, wherein:

a region formed while irradiating an electron beam thereon and a region formed while not irradiating the electron beam thereon are located different places when viewing the substrate in a direction vertical to its surface.

6. The group I-VII semiconductor single crystal thin film as set forth in any one of Claims 1 to 5 being a CuCl thin film.

7. The group I-VII semiconductor single crystal thin film as set forth in any one of Claims 1 to 5 being a metal halide semiconductor thin film.

8. A process for producing a group I-VII semiconductor single crystal thin film on a substrate made from ionic single crystals, comprising:

forming a buffer layer on the substrate, the buffer layer being for alleviating distortion caused due to a difference in lattice constant between the substrate and the group I-VII semiconductor single crystal thin film; and

forming the group I-VII semiconductor single crystal thin film while irradiating an electron beam on the buffer layer.

9. A process for producing a group I-VII semiconductor single crystal thin film, comprising:

forming a layer of the group I-VII semiconductor single crystal thin film while irradiating an electron beam thereon; and

forming the rest of the group I-VII semiconductor

single crystal thin film while not irradiating the electron beam thereon.

10. The process as set forth in Claim 8, comprising:  
forming a layer of the group I-VII semiconductor single crystal thin film while irradiating an electron beam thereon; and

forming the rest of the group I-VII semiconductor single crystal thin film while not irradiating the electron beam thereon.

11. The process as set forth in Claim 9 or 10, wherein:

the layer formed while irradiating the electron beam thereon and the layer formed while not irradiating the electron beam thereon have film thicknesses that are decided in consideration of a film thickness of the group I-VII semiconductor single crystal thin film.

12. The process as set forth in any one of Claims 8 to 11, wherein:

the film thickness of the group I-VII semiconductor single crystal thin film is a film thickness with which an internal electric field is resonance-increased.

13. The process as set forth in any one of Claims 8 to 12, wherein:

an acceleration voltage HV of the electron beam is  $0(\text{kV}) < \text{HV} \leq 30 (\text{kV})$ .

14. The process as set forth in any one of Claims 8 to 13, wherein:

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a filament current FI of the electron beam is  $0 \text{ (A)} < FI \leq 5 \text{ (A)}$ .

15. The process as set forth in any one of Claims 8 to 14, wherein:

an irradiation current HI of the electron beam is  $0(\mu\text{A}) < HI \leq 150(\mu\text{A})$ .